

At the points marked a and b, but at no other place, rapid flashes of lightning, with now and then a bolt toward the earth, were playing; at c' c'' and c'''', the gray region between the cloud and the earth and which was evidently the region of falling rain, as shown by the flashes of lightning, the strange phenomenon occurred. This region, for brevity's sake, I will designate 'rain-region.'

At intervals of from one to two minutes (the lightning at a and b increasing from beginning to close of each interval) the entire rain-region would glow with a faint white light for about one or two seconds, rarely longer, in appearance similar to the auroral light. This light seemed to spring up at c' first, and, getting brighter while running to c''', cease suddenly; immediately afterward the lightning at a and b would be least vigorous. The phenomenon continued to repeat itself during the hour that I observed the cloud; at first I supposed it to be a kind of sheet-lightning, but afterward, when watching it intently, I could see no signs of lightning proper, only a steadily increasing glow, which would remain along the entire rainregion for a second or two and theu cease more suddenly than Eola, Oregon, 12th. it came.

There were no streaks or flashes of lightning running through the cloud, which seemed to have a uniform density throughout its length from a to b, and this glow could not have been the reflected light from the flashes which occurred at either end of the cloud, as I carefully noted that the brightest flashes produced no such effect. Had the glow been reflected light, it would have been in flashes like the flash producing it.

At 2 a. m. on the 30th, I observed in the west and north an inky black cloud rapidly approaching from that direction in one long line accompanied by thunder and strong wind and followed by but little hail and little rain of large drops."

THUNDER-STORMS.

Thunder-storms occurred in the various districts on the fol-

New England .- 2d, 3d, 4th, 6th, 8th, 26th, 28th, 29th, Middle Atlantic states -3d, 5th, 8th, 11th, 13th, 16th, 20th,

South Atlantic states.—3d, 8th, 9th, 10th, 12th, 13th, 16th, 17th, 18th, 27th to 30th.

Florida peninsula.—1st to 10th, 12th, 17th, 18th, 19th, 24th, 30th. Eastern Gulf states .- 2d, 3d, 7th, 8th, 17th, 24th, 27th, 30th. Western Gulf states.—2d, 3d, 5th, 6th, 7th, 9th, 11th, 14th to 25th, 28th, 29th, 30th.

Rio Grande valley.—12th, 16th, 17th, 18th, 24th, 25th.
Tennessee.—2d, 3d, 7th, 9th, 15th, 16th, 17th, 25th, 2*th, 30th. Ohio valley.—2d, 5th to 8th, 10th, 15th to 18th, 25th, 26th, 28th, 30th.

Lower lake region .- 2d to 5th, 7th, 17th, 25th, 26th, 28th,

Upper lake region.—1st, 2d, 6th, 7th, 17th, 20th, 25th, 27th, 28th.

Extreme northwest.—6th, 11th, 15th, .7th, 18th, 21st, 22d, 24th.

Upper Mississippi valley .- 1st, 2d, 5th, 7th, 10th, 12th, 15th, 16th, 17th, 20th, 21st, 22d, 25th, 26th, 28th, 30th.

Missouri valley.—1st, 2d, 3d, 5th to 8th, 10th, 11th, 12th, 14th to 30th.

Northern slope.—5th, 18th, 21st, 24th, 29th.

Middle slope.-1st to 6th, 8th, 13th, 14th, 15th, 18th to 21st, 24th, 27th, 28th, 29th.

Southern slope.—1st, 5th, 11th, 13th. 14th, 17th, 19th to 22d, 29th.

Southern plateau.—3d, 12th to 15th, 18th, 26th, 30th. Middle plateau.—1st, 4th, 13th, 14th, 28th, 29th, 30th.

Northern plateau.—Boisé City, Idaho, 12th, 27th.

North Pacific coast region.—Roseburg, Oregon, 2d, 11th;

Middle Pacific coast region .-- 2d, 4th, 7th to 12th, 15th, 19th, 26th, 30th.

South Pacific coast region .- San Diego, California, 13th; Los Angeles and Cahuenga valley, California, 27th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arizona.-25th.

Arkansas.—1st, 5th, 6th, 10th, 16th, 18th, 23d, 27th, 29th, 30th.

California.—1st, 3d, 5th, 6th, 9th, 11th, 12th, 18th, 23d, 24th, 25th.

Connecticut.—1st, 7th.

Dakota.—4th, 8th, 11th, 21st, 23d, 24th.

District of Columbia .- 17th, 30th.

Florida. 4th, 12th, 13th, 15th, 17th, 20th, 21st, 22d, 25th, 30th. Georgia.-4th, 6th, 22d, 29th, 30th.

Illinois.—1st, 6th, 8th, 9th, 11th, 20th, 27th, 29th.

Indiana.—1st, 9th, 21st, 23d.

Iowa.—8th, 11th, 12th, 24th, 25th, 27th, 28th, 29th.

Kansas.—8th, 16th, 20th, 26th, 27th.

Louisiana.—1st, 25th.

Maine.—19th, 26th.

Maryland.-17th, 18th.

Massachusetts.—7th, 9th, 11th, 15th, 28th.

Michigan.-1st, 4th, 5th, 9th, 10th, 14th, 16th, 17th, 18th, 25th, 26th, 27th.

Minnessota.—8th. Missouri.—18th, 27th. Nebraska. - 7th, 10th, 12th, 21st, 22d, 26th, 28th. Nevada .- 12th. New Jersey .- 7th, 17th, 28th. New York.—1st, 6th, 7th, 9th, 11th, 18th, 30th, North Carolina.—3d, 10th, 12th, 15th, 17th. Ohio.—1st, 2d, 5th, 10th, 14th, 16th, 21st, 25th. Oregon.—23d, 24th, 25th, 27th. Pennsylvania.—2d, 17th, 18th, 21st, 26th, 28th, 30th. Rhode Island.—1st, 7th, 11th, 15th, 28th. South Carolina.—7th. Tennessee.—2d, 12th, 14th, 21st, 26th, 27th, 29th. Texas.—4th, 11th, 16th. Utah.—25th. Virginia.—5th, 9th, 14th, 17th, 22d, 24th, 26th, 30th. Washington Territory.—8th, 20th, 23d. Wisconsin.—4th, 27th. Wyoming.—3d. 12th, 13th, 15th, 16th, 18th, 19th, 25th. LUNAR HALOS. Lunar halos were observed in the various states and territories as follows: Alabama.-27th. Arizona.—3d, 21st, 22d, 25th. Arkansas.—21st, 26th, 28th, 29th. California.—23d to 26th. Colorado. -- 26th. Connecticut.—25th. Dakota.—22d to 26th.
Florida.—20th to 27th, 30th.
Georgia.—24th, 26th, 27th, 29th.
Illinois.—21st, 27th. Indiana.—20th, 21st, 23d, 24th, 27th, 29th. Iowa.—1st, 20th, 22d, 23d, 24th, 26th, 27th, 28th. Kansas.—4th, 20th, 24th, 26th, 27th, 28th. Kentucky.—20th, 23d, 27th. Louisiana.—19th, 24th. Maine.—20th, 23d, 27th. Maryland.—1st, 18th. Massachusetts.—7th, 25th.
Michigan.—1st, 20th, 23d to 27th.
Minnesota.—23d, 26th, 28th.
Missouri.—1st, 24th, 26th, 28th. Montana.-Fort Shaw, 23d.

Nebraska.-19th, 21st, 22d, 26th. Nevada.-24th, 25th. New Hampshire.—30th.
New Jersey.—1st, 2d, 24th, 27th.
New York.—1st, 25th, 27th, 30th.

North Carolina.—1st, 20th, 21st, 23d, 26th to 29th. Oregon.—20th, 23d, 24th, 25th.

Pennsylvania.—18th, 21st, 25th, 27th. Rhode Island.—25th.

South Carolina .- 22d, 28th.

Tennessee.—1st, 2d, 20th, 21st, 23d, 25th, 26th, 27th, 29th, 30th. Texas.—1st, 23d, 24th, 25th, 27th, 28th, 30th.

Virginia.—1st, 23d, 22d, 24th to 28th.
Washington Territory.—21st, 24th, 25th.
Wisconsin.—1st, 24th, 26th, 27th.
Wyoming.—Fort Bridger, 23d.

The phases of the moon during April were: last quarter, 7th, 9.36 a.m.; new moon, 15th, 12.46 a.m.; first quarter, 21st, 6.14 p. m.; full moon, 29th, 1.08 a. m.; apogee, 6th, 11.30 a. m.; perigee, 18th, 9.48 a.m.

Milwaukee, Wisconsin: on the 26th, at 2 p. m., Racine Point, twenty five miles south of Milwaukee, was plainly visible.

Duluth, Minnesota, 30th: three small islands on the south shore of Lake Superior, ordinarily not visible, were plainly seen on this date.

Mackinaw City, Michigan 4th. Saint Vincent, Minnesota, 2d, 4th.

Fort Totten, Dakota, 12th.

Webster, Dakota, 1st, 2d, 4th, 5th, 8th, 9th, 11th, 12th, 14th, 15th, 17th, 18th, 23d, 24th, 26th, 28th, 29th, 30th.

Sherlock, Kansas, 6th, 15th, 16th, 28th.

MISCELLANEOUS PHENOMENA.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-four stations show 4,897 observations to have been made, of which seven were reported doubtful; of the remainder, 4,890, there were 4,205, or 86.0 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for April, 1885:

Date— April, 1885.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
I, 10 a. m	3 0 1 1 1 1 2 0 0	0 20† 30† 5‡ 45↓ 30† 5 5† 10† 0 10† 25‡	0 0 0 0 0 0 0 0	0 151 101 0 0 0	0 1 0 0	3 3 0 0 3 5	36 56 4 5 2 2 1 3 3 3 3 6 7	501 501 501 901 120 401 301 10 151 201 351 351	

Faculæ were seen at the time of every observation.

Professor Carpenter, of Lansing, Michigan, reports sun spots during the month of April as follows:

1st, 2 groups, 20 spots; 4th, 3 p. m., 3 groups, 17 spots; 6th, 3 p. m., 5 groups, 40 spots; 18th, 1 p. m., 2 groups, 13 spots; 21st, 2.45 p. m., 4 groups, 30 spots; 25th, 5 groups, 16 spots; 29th, 3 p. m., 5 groups, 28 spots. On account of cloudy weather, which prevailed during the greater part of the month, the above were the only observations made.

EARTHOUAKES.

The following notes, referring to the earthquakes which have occurred in California during April, 1885, are taken from the reports of Signal Service and voluntary observers and from various newspapers published in California:

Salinas, Monterey county, 2d.: at about midnight an earthquake shock was felt, its probable oscillation was from north

to south.

Fresno, Fresno county, 2d: a sharp shock of earthquake was felt at this place this morning about 7.25 o'clock. The shock appeared to come from the east. (San Francisco Evening Bulletin, April 2d.)

Merced, Merced county, 2d: a heavy shock of earthquake was felt here at 7.25 this morning. It was noticed by many persons in different parts of the town, but most sensibly in the third and fourth stories of El Capitan Hotel. (San Francisco Evening Bulletin, April 2.)

Sacramento, Sacramento county, 3d: earthquake shocks were felt at 10.15 a.m., lasting a few secounds; two distinct shocks occurred with a motion from northeast to southwest.

San Buenaventura, Ventura county, 7th: two distinct shocks of earthquake were felt here this morning at 2 o'clock. The shocks were from northeast to southwest. (Sacramento Daily

Record Union, April 8.)
Bakersfield, Kern county, 7th: a shock of earthquake occurred here at 2.30 a.m.; it lasted about two seconds, and the motion was from north to scuth. It was followed by a rumbling